

## Review Sheet - Unit 2: Cycles

Name: \_\_\_\_\_

### Atoms & Molecules:

1. How is an atom similar to a molecule? How are they different?

**Molecules are made from more than one atom. They are similar because they are made from the same things. They are different in number.**

2. Complete this analogy... Molecule:Atom::Train:\_\_\_\_\_ Explain your reasoning.

**Train:Car A train is made from more than one car, just like a molecule is made from more than one atom.**

3. Is water an atom or a molecule? Explain.

**Water is a molecule because it is made from two hydrogen atoms and an oxygen atom...  $H_2O$**

### Water Properties

4. Why is water called the universal solvent?

**Is capable of dissolving a large number of different solutes. Almost everything dissolves in water to some degree.**

5. How is a solute similar to a solvent? How are they different?

**Solutes and solvents are both chemicals that are part of a mixture or a solution. They are different only in their amounts. In a mixture, the small amount of solute is dissolved into a large amount of solvent.**

6. What is the difference between a polar molecule and a non-polar molecule?

**Polar molecules have positive and negative “ends” to them. Non-polar molecules do not have any charged positions.**

7. What happens to the density of water when it freezes? Why is this important to animals that live in water?

**It decreases. This is important because the decrease in density makes ice float on water. If ice sunk in water then the animals that hibernate at the bottom of lakes would be killed during the winter.**

8. What does it mean when people say that water has a “high heat capacity”?

**Water can absorb a fair amount of energy without changing its temperature very much.**

9. Why is a high heat capacity important to our environment?

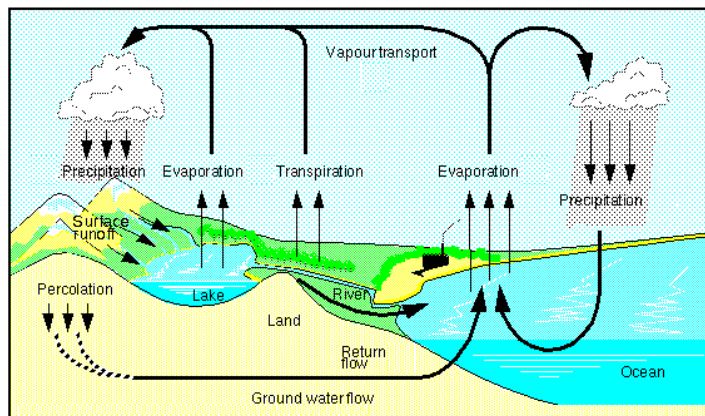
**The oceans, lakes, and other large bodies of water maintain a fairly constant temperature over time. This also helps the oceans to absorb large amounts of solar energy without heating up the planet.**

10. Is surface tension caused by adhesion or cohesion? Explain your answer.

**Cohesion.** Surface tension is caused when the liquid particles (water especially) hold onto one another tightly and make a “barrier” that can float a paper clip or support a water bug. (Adhesion is when one material is attracted to a different material.)

### Hydrologic Cycle

11. Draw a diagram of the water cycle in action.



Courtesy Erich Roeckner, Max Planck Institute for Meteorology

12. What is the difference between evaporation and transpiration?

**Transpiration is evaporation that occurs through the leaves of a plant.**

13. Where does water spend the most time during the water cycle? Where does it spend the shortest amount of time?

**Water spends a lot of time going back and forth between the clouds and the ocean. Water doesn't spend much time at all in “surface runoff” and animals.**

14. What is more important to plants, infiltration or precipitation? Explain.

**Either answer is fine if you explain yourself. Infiltration is when water sinks into the soil so that plants can use it. Precipitation is when water falls from the sky as rain, snow, sleet, etc. You can't have infiltration without precipitation, and if the precipitation doesn't infiltrate then it is useless to plants.**

### Carbon Cycle

15. What processes in the carbon cycle add carbon dioxide into the atmosphere?

**Respiration, decomposition of organic material, burning fossil fuels**

16. What processes in the carbon cycle take carbon out of the atmosphere?

**Photosynthesis, Diffusion of CO<sub>2</sub> into the ocean.**

17. Name two places where carbon is stored for long periods.

**Fossil Fuels, Trees, Ocean**

18. Why is the carbon cycle sometimes called the carbon-oxygen cycle?

**As carbon cycles through the planet it often reacts with oxygen to form CO<sub>2</sub>. Then when carbon is stored, the oxygen may be removed (photosynthesis). So, changing carbon from one form to another often involves taking oxygen from the environment or putting it back.**

Biogeochemical Cycles

19. What other elements or compounds also are cycled through the earth?

**Nitrogen, Oxygen, Phosphorus**

20. What is the law of conservation of matter?

**You cannot create or destroy atoms (matter). You have to trade those atoms around.**

21. How does the law of conservation of matter apply to biogeochemical cycles?

**During all of the biogeochemical cycles some atoms (carbon, oxygen, hydrogen, phosphorus, etc.) are traded from one form to another, BUT those atoms are all still there. Atoms are not destroyed. For examples, when fossil fuels are burned, the carbon, hydrogen and oxygen that make up the fuel is rearranged to form CO<sub>2</sub> and H<sub>2</sub>O that enter the atmosphere. The atoms in the fuel still exist, they are just in a different form after being burned.**